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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,001	10/30/2003	Hidenori Usuda	9319S-000575	7423
27572	7590	07/17/2006	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303			FIDLER, SHELBY LEE	
			ART UNIT	PAPER NUMBER
			2861	

DATE MAILED: 07/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/698,001

Applicant(s)

USUDA ET AL.

Examiner

Shelby Fidler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 14, 15, 29 and 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13, 16-28, 31 and 32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5, 8, 16-18, 20, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo (US 6257688 B1) in view of Fukano (US 6547359 B2).

**Kubo teaches the following:**

**\*regarding claims 1 and 16**, a droplet discharging apparatus (*col. 3, line 9*) comprising:  
means for discharging a discharge liquid in the form of droplets through an aperture (*col. 3, lines 14-15*) by mechanically deforming a piezoelectric element (*col. 4, lines 44-45*) by a normal drive signal;

a drive integrated circuit (head driver 83, Fig. 2);

wherein the droplets are discharged from the aperture by a cooling drive signal, based on an ambient temperature of the printing apparatus (*col. 3, lines 8-11*), which is different from the normal drive signal (*col. 3, lines 19-23*).

**\*regarding claims 2 and 17**, the droplets are discharged for a plurality of times by the cooling drive signal so as to cool the discharge liquid (*col. 7, lines 21-30 shows that Kubo's invention prevents the occurrence of ink spray which results from the continuous application of pulses to the electrodes; therefore, Kubo's invention must undergo the continuous application of pulses to the*

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*electrode, resulting in droplet discharge for a plurality of times under the cooling signal) to a specified temperature (Figure 4)*

**\*regarding claims 3 and 18**, the cooling drive signal is set to a low frequency level that does not cause the piezoelectric element to heat the discharge liquid (*col. 6, lines 36-40*)

**\*regarding claims 5 and 20**, if the temperature of the discharge liquid detected by a temperature detecting means exceeds a predetermined threshold temperature, then the droplets are discharged from the apertures by the cooling drive signal (*col. 7, lines 15-16*)

**\*regarding claims 8 and 23**, the discharge liquid is a printing ink (*col. 3, line 9*)

**\*regarding claim 22**, the cooling discharge and the normal discharge are mutually exclusive and cannot operate concurrently

**Kubo does not expressly teach the following:**

**\*regarding claims 1 and 16**, the drive integrated circuit is disposed adjacent to and in thermal contact with the piezoelectric element; and

a temperature sensor associated with the drive integrated circuit for sensing a temperature of the drive integrated circuit;

wherein the sensed temperature of the drive integrated circuit approximates a temperature of the piezoelectric element;

wherein the approximated temperature of the piezoelectric element approximates a temperature of the discharge liquid; and

droplets are discharged based on the approximated temperature of the discharge liquid

**Fukano teaches the following:**

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**\*regarding claims 1 and 16**, the drive integrated circuit (*head drive circuit 130*) is disposed adjacent to and in thermal contact with the piezoelectric element (*Fig. 2 and col. 1, lines 52-54*); and

a temperature sensor (*sensors 141-147, Fig. 4*) associated with the drive integrated circuit for sensing a temperature of the drive integrated circuit (*col. 8, lines 1-3*);

wherein the sensed temperature of the drive integrated circuit approximates a temperature of the piezoelectric element (*it is obvious to Fukano's invention that the sensed temperature of the drive integrated circuit approximates the piezoelectric element since they are thermally coupled as shown in col. 1, lines 52-54 and col. 8, lines 34-36*)

wherein the approximated temperature of the piezoelectric element approximates a temperature of the discharge liquid (*it is obvious to Fukano's invention that the approximated temperature of the piezoelectric elements approximates the discharge liquid temperature since they are thermally coupled as shown in col. 1, lines 52-54 and col. 8, lines 34-36*); and

droplets are discharged based on the approximated temperature of the discharge liquid (*col. 2, lines 52-59*)

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize Fukano's temperature sensor into Kubo's invention. The motivation for doing so, as taught by Fukano, is to drive the print head based on the determined temperatures (*col. 2, lines 55-58*).

Claims 4 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo (US 6257688 B1) as modified by Fukano (US 6547359 B2), as applied to claims 1 and 16 above, and further in view of Tajika (US 5861895).

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**Kubo as modified by Fukano teach all claimed limitations except for the following:**

**\*regarding claims 4 and 19**, a cooling drive signal with a waveform shape as to cause droplets of maximum weight

**Tajika teaches the following:**

**\*regarding claims 4 and 19**, a cooling drive signal with a waveform shape as to cause droplets of maximum weight (*col. 11, lines 33-35*)

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize Tajika's waveform to provide droplets of maximum weight into the invention of Kubo as modified by Fukano. The motivation for doing so, as taught by Tajika, is to minimize problems with temperature control (*col. 11, lines 25-28*)

Claims 6 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo (US 6257688 B1) as modified by Fukano (US 6547359 B2), as applied to claims 1 and 16 above, and further in view of Nozawa (US 6499821 B1).

**Kubo as modified by Fukano teach all claimed limitations except for the following:**

**\*regarding claims 6 and 21**, if the number of discharges within a predetermined time performed in response to the normal drive signal exceeds a predetermined threshold number of times, then the droplets are discharged from the aperture by the cooling drive signal

**Nozawa teaches the following:**

**\*regarding claims 6 and 21**, if the number of discharges within a predetermined time performed in response to the normal drive signal exceeds a predetermined threshold number of times, then the droplets are discharged from the aperture by the cooling drive signal (*col. 8, lines 1-12*)

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At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize Nozawa's threshold discharge count into the invention of Kubo as modified by Fukano. The motivation for doing so, as taught by Nozawa, is to avoid a "scorch" condition (col. 7, line 65 - col. 8, line 6).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo (US 6257688 B1) as modified by Fukano (US 6547359 B2), as applied to claim 1 above, and further in view of Mikami (US 4633269).

**Kubo as modified by Fukano teach all claimed limitations except for the following:**

**\*regarding claim 7**, the cooling discharge by the cooling drive signal is carried out between normal discharges of droplets by the normal drive signal

**Mikami teaches the following:**

**\*regarding claim 7**, the cooling discharge by the cooling drive signal is carried out between normal discharges of droplets by the normal drive signal (*col. 5, lines 40-46*)

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize Mikami's alternating discharges into the invention of Kubo as modified by Fukano. The motivation for doing so, as taught by Mikami, is to control the temperature (*col. 5, lines 36-38*).

Claims 9, 11-13, 24, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo (US 6257688 B1) as modified by Fukano (US 6547359 B2), as applied to claims 1 and 16 above, and further in view of Usui et al. (US 6981761).

**Kubo as modified by Fukano teach all claimed limitations except for the following:**

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**\*regarding claims 9 and 24**, the discharging liquid is an electrically conductive material for forming a wiring pattern

**\*regarding claims 11 and 26**, the discharge liquid is a resin for forming a color layer of a color filter

**\*regarding claims 12 and 27**, the discharge liquid is an electro-optic material

**\*regarding claims 13 and 28**, the electro-optic material is a fluorescent organic compound exhibiting electroluminescence

Usui et al. teaches the following:

**\*regarding claims 9 and 24**, the discharging liquid is an electrically conductive material for forming a wiring pattern (*col. 27, lines 13-15*)

**\*regarding claims 11 and 26**, the discharging liquid is a resin for forming a color layer of a color filter (*col. 25, lines 28-31*)

**\*regarding claims 12 and 27**, the discharge liquid is an electro-optic material (*col. 27, lines 35-40*)

**\*regarding claims 13 and 28**, the electro-optic material is a fluorescent organic compound exhibiting electroluminescence (*col. 27, lines 27-30*)

At the time of invention, it would have been obvious to a person of ordinary skill in the art to discharge an electro-optic material from the invention of Kubo as modified by Fukano. The motivation for doing so, as taught by Usui et al., is to enable the manufacture of EL display devices (*col. 27, lines 24-27*).

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Claims 10 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo (US 6257688 B1) as modified by Fukano (US 6547359 B2), as applied to claims 1 and 16 above, and further in view of Shinoura (US 6714173 B2).

**Kubo as modified by Fukano teach all claimed limitations except for the following:**

**\*regarding claims 10 and 25, the discharge liquid is a transparent resin for forming a microlens**

**Shinoura teaches the following:**

**\*regarding claims 10 and 25, the discharge liquid is a transparent resin for forming a microlens (*col. 9, lines 40-43*)**

At the time of invention, it would have been obvious to a person of ordinary skill in the art to discharge a transparent resin from the invention of Kubo as modified by Fukano. The motivation for doing so, as taught by Shinoura, is to produce lenses (*col. 9, lines 22-25*).

Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo (US 6257688 B1) as modified by Fukano (US 6547359 B2), as applied to claims 1 and 16 above, and further in view of Ishizaki (US 6454377 B1).

**Kubo as modified by Fukano teach all claimed limitations except for the following:**

**\*regarding claims 31 and 32, the temperature of the discharge liquid is determined by detecting a temperature of the piezoelectric element**

**Ishizaki teaches the following:**

**\*regarding claims 31 and 32, the temperature of the discharge liquid is determined by detecting a temperature of the piezoelectric element (*col. 16, lines 32-40*)**

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At the time of invention, it would have been obvious to a person of ordinary skill in the art to modify the position of Kubo's temperature sensor to measure the temperature of the discharge liquid instead of the ambient temperature. The motivation for doing so, as taught by Ishizaki, is so that ink droplets may be ejected in a stable manor irrespective of the changes in ink due to temperature (*col. 16, lines 40-43*).

### *Response to Arguments*

Applicant's arguments with respect to claims 1-32 have been considered but are moot in view of the new ground(s) of rejection.

However, please see new rejection Kubo (US 6257688 B1) in view of Fukano (US 6547359 B2). Kubo as modified by Fukano discloses a drive integrated circuit disposed adjacent to and in thermal contact with the piezoelectric element and a temperature sensor associated with the drive integrated circuit for sensing a temperature of the drive integrated circuit.

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*Communication with the USPTO*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shelby Fidler whose telephone number is (571) 272-8455. The examiner can normally be reached on MWF 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*SLF* 6/26/06

SLF

*K. FEGGINS* 7/06  
SENIOR EXAMINER